U.S. DEPARTMENT OF THE INTERIOR
U.S. GEOLOGICAL SURVEY

MISCELLANEOUS FIELD STUDIES
MAP MF-2270
Pamphlet accompanies map

Base computer-generated from U.S. Geological Survey Resource-Oriented Computer System

Albers equal area projection

SCALE 1:7,500,000

0 100 200 300 MILES

Compiled by J.A. Peterson and M.L. Zientek, 1987-1993
Edited by Julia Thomas; prepared by Lori Moore Ghequiere

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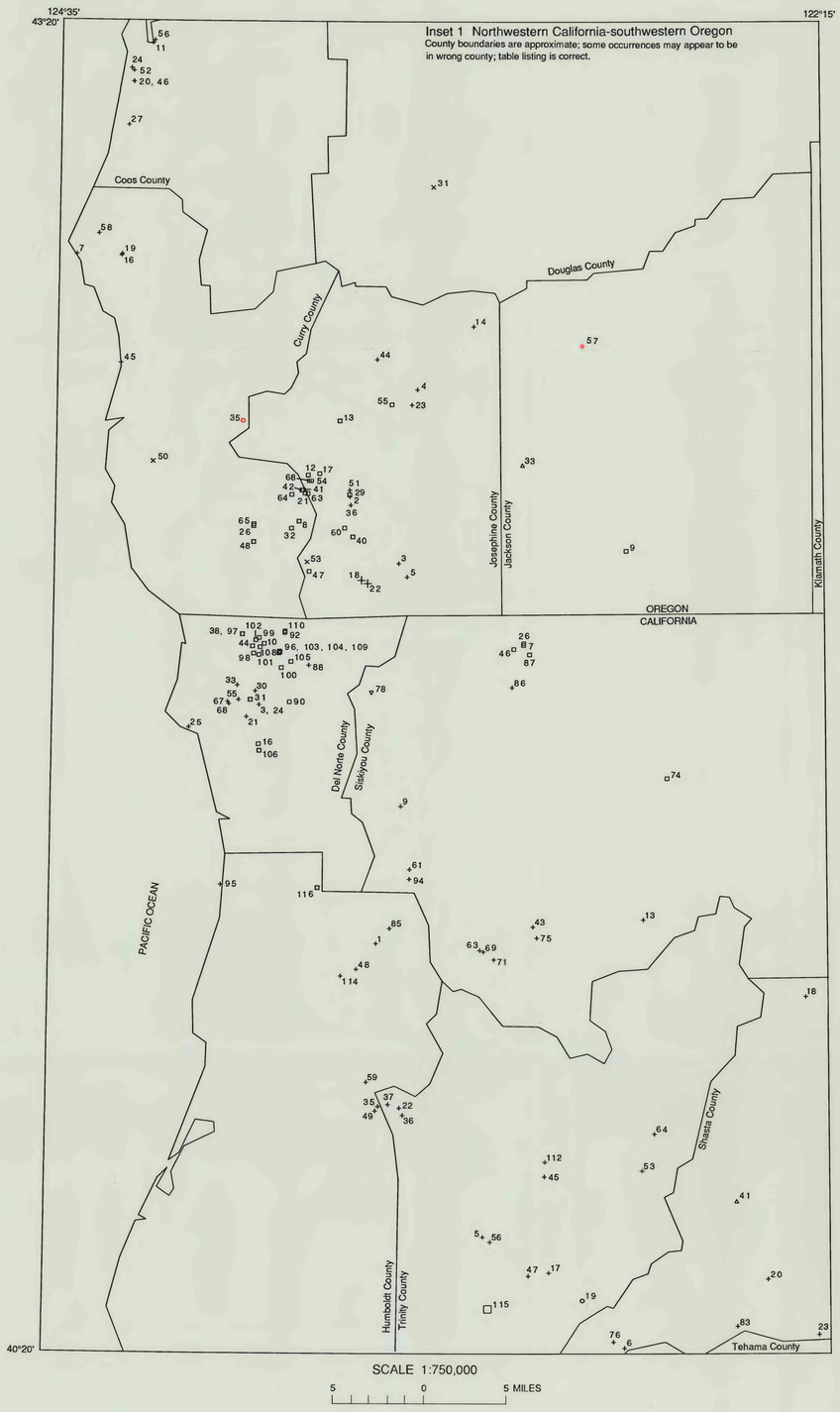

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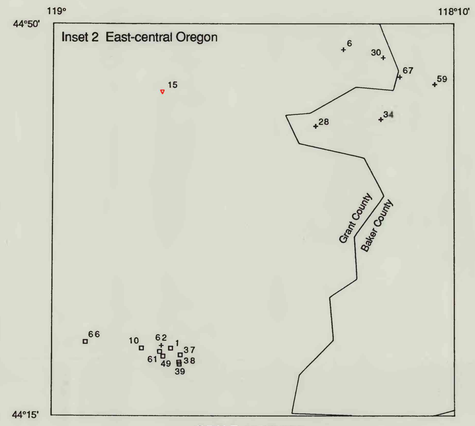

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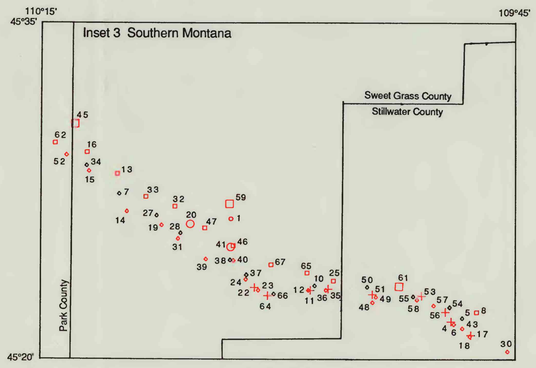

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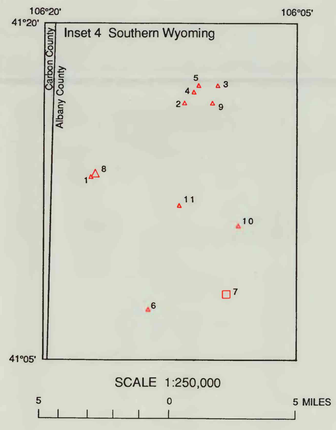

SCALE 1:250,000

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EXPLANATION

[Numbers refer to table 1 in accompanying pamphlet. Platinum-group element, PGE; larger symbols indicate important deposits; smaller symbols indicate other occurrences meeting criteria outlined in text]

DEPOSIT TYPES

Residual deposits

+ Placer gold-PGE

× Lateritic nickel

Magmatic sulfide deposits

□ Merensky Reef PGE, Picket Pin, stratiform sulfide without published model

◇ Duluth copper-nickel-PGE, Stillwater nickel-copper, synorogenic-synvolcanic nickel-copper

○ Other magmatic sulfide deposits without published models

Magmatic oxide deposits

□ Podiform chromite

+ PGE-enriched stratiform chromitite

◇ Bushveld chromite

○ Alaskan PGE, other magmatic oxide deposits without published models

Hydrothermal deposits assocaited with mafic or ultramafic rocks

△ New Rambler copper-gold-PGE, Revais Creek copper-gold-PGE

Hydrothermal deposits associated with calc-alkaline porphyry rocks

▽ Porphyry copper, porphyry copper-skarn related, polymetallic veins

Deposits associated with alkaline igneous rocks

× Syenite-hosted copper-silver-PGE

Miscellaneous deposit types

△ Carbonate-hosted gold-silver, massive sulfide, low-sulfide gold-quartz veins, occurrences without models, polymetallic replacement

▽ Unknown deposit types

INTRODUCTION

[see accompanying pamphlet for references cited]

In conjunction with preparing maps of the geologically permissive areas for the occurrence of platinum-group elements (PGE) in the conterminous United States (Zientek and others, 1988; Peterson, in press), the Mineral Resource Data System (MRDS) has been updated to provide more detailed information about PGE. MRDS now contains 505 records for PGE in the conterminous United States, 109 of which are completely new records, and many others of which are previously existing records that have been updated with PGE information. These maps and table represent the status of the MRDS records as of November 1993; because MRDS is designed to be dynamic, further information about PGE can be added as it becomes important or available.

The initial effort in the 1970's to catalog PGE localities (Blair and others, 1977; Page and Tooker, 1979) involved an extensive literature search for mention of PGE in all types of mineral deposits and provided individual occurrence records for all identified localities of PGE regardless of PGE concentrations or whether the presence of PGE had been verified. Entries included sites where PGE had been mined, where PGE-bearing minerals had been documented, for which PGE analytical information existed, and where someone reported the presence of PGE. This was a valid approach at that time because there was sparse analytical information for PGE. Since that time, much more analytical information has become available, particularly for podiform chromite deposits (Carlson and others, 1985) but also elsewhere within the United States (see, for example, Page and others, 1992). Some of these recent studies, enabled by more sensitive analytical techniques that can now detect very small quantities of PGE, are beginning to suggest that small amounts of PGE may be present in a wide variety of deposit types, some of which are not hosted within the conventional magmatic ore deposits.

For the present study, every effort was made to enter records into MRDS for PGE occurrences in mines or prospects from which PGE have been mined, for which PGE minerals have been documented, or for which analytical data indicate concentrations of PGE either greater than or equal to 100 ppb or, for podiform chromite deposits, in the upper 10th percentile of analyzed deposits. In addition, some occurrences have been included regardless of PGE concentration, such as those for which scientific data suggest that further study may be warranted to characterize the occurrences (PGE in the Mesozoic basins of the eastern United States, for example) or where the geologic environment is of current interest to explorationists (PGE in black shales, for example). However, to attempt to catalog all known analytical occurrences of PGE within the United States would be a formidable task and not of much use in delineating deposits of potential interest for PGE exploration. Should mining technology or economic conditions change such that very low grade occurrences become targets for PGE production, then the appropriate PGE data should be entered into MRDS.

Because of the differing "occurrence" definitions used when entering MRDS data, the PGE information appears somewhat haphazard; rather than delete those records for which the PGE information is unverified or PGE values are low, the table and maps in this paper broadly indicate the relative importance of the records by indicating the knowledge of PGE for each MRDS entry and by showing on the maps only those localities that meet the analytical cutoff, identified mineral, or PGE production criteria mentioned above. Several references to PGE localities in the older literature that could not be approximately located or verified have not been included.

In the 1980's the U.S. Geological Survey began publishing mineral deposit models, some of which characterize types of deposits known to contain PGE (Cox and Singer, 1986). Where appropriate, these models have been assigned to the PGE occurrences documented in MRDS (see table 1). Other PGE occurrences that are fairly well described but which do not fit into published models have been given informal deposit-type names. Some occurrences are so poorly understood or so poorly described that it was not possible to determine a deposit type. These have been classified as "unknown."

MAPS SHOWING PLATINUM-GROUP-ELEMENT OCCURRENCES IN THE CONTERMINOUS UNITED STATES, UPDATED AS OF 1993

By

Jocelyn A. Peterson

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For sale by U.S. Geological Survey, Map Distribution, Box 25286, Federal Center, Denver, CO 80225